

What is claimed is:

- 1 1. A method of measuring a pattern comprising:  
2 exposing an evaluation pattern having at least two  
3 light-impermeable line patterns to form on a target a plurality  
4 of transferred patterns each based on said evaluation pattern;  
5 and  
6 detecting which one or ones among said transferred patterns  
7 is brought into a state that any one of said two light-impermeable  
8 line patterns disappears.
- 1 2. The method as claimed in Claim 1, wherein a plurality of  
2 said evaluation patterns are provided on a single mask, and said  
3 exposing is executed with said single mask to thereby form said  
4 plurality of transferred patterns on said object.
- 1 3. The method as claimed in Claim 2, wherein at least one  
2 of said light-impermeable line patterns is different from one  
3 another among said evaluation patterns.
- 1 4. The method as claimed in Claim 3, wherein each of said  
2 evaluation patterns has at least one additional  
3 light-impermeable line pattern between said two  
4 light-impermeable line patterns, and in at least one of said  
5 evaluation patterns, each of said two light-impermeable line  
6 patterns is different in width from said additional  
7 light-impermeable line pattern.
- 1 5. The method as claimed in Claim 3, wherein said plurality

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2 of evaluation patterns are arranged adjacent to one another to  
3 constitute a group, and a plurality of said groups are distributed  
4 on said mask.

1 6. The method as claimed in Claim 1, wherein said exposing  
2 is executed a plurality of times with a mask having said evaluation  
3 pattern so that said plurality of transferred patterns are formed  
4 on said target.

1 7. The method as claimed in Claim 6, wherein said exposing  
2 are executed a plurality of times while varying exposure amount  
3 for each exposure.

1 8. The method as claimed in Claim 7, wherein a plurality of  
2 ones of said evaluation pattern are formed and distributed on  
3 said mask, and the each of said light-impermeable line patterns  
4 is identical in width among said evaluation patterns.

1 9. A method for measuring a coma aberration in an optical  
2 system with a projection optical system, the method comprising:  
3 illuminating with light a mask that is provided with a  
4 evaluation pattern having at least two light-impermeable line  
5 patterns;  
6 leading the light through said mask to said projection  
7 optical system and exposing a target with an output from said  
8 projection optical system to create on said target a plurality  
9 of transferred patterns each based on said evaluation pattern;  
10 detecting which one or ones among said transferred patterns

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11 is brought into state that any one of said two light-impermeable  
12 line patterns disappears; and  
13 evaluating a coma aberration in said projection optical  
14 system according to a result of said detecting.

1 10. The method as claimed in Claim 9, wherein a plurality of  
2 said evaluation patterns are provided on said mask and said  
3 exposing is executed with said mask to form said plurality of  
4 transferred patterns on said target, and at least one of said  
5 light-impermeable lines is different from one another among said  
6 evaluation patterns.

1 11. The method as claimed in Claim 10, further comprising:  
2 determining a correlation between magnitude of coma  
3 aberration belonging to said projection optical system and the  
4 line widths of a state where one of said two light-impermeable  
5 line patterns disappears,  
6 wherein the magnitude of coma aberration is determined  
7 from said correlation and said result of detection.

12. The method as claimed in Claim 9, wherein a plurality of transferred patterns are formed on said target by executing said exposing a plurality of times with said mask while varying exposure amount for each exposure.

1 13. The method as claimed in Claim 12, further comprising:  
2 determining a correlation between magnitude of coma  
3 aberration belonging to said projection optical system and the

4 light exposures of a state where any one of said two  
5 light-impermeable line patterns disappears,  
6 wherein the magnitude of coma aberration is determined  
7 from said correlation and said result of detection.

1 14. A coma aberration measuring method comprising:  
2 placing an evaluation mask on a mask stage of a projection  
3 exposure device;  
4 placing an evaluation wafer with a photosensitive film  
5 coated on its surface on a wafer stage;  
6 illuminating, with a lighting optical system, said  
7 evaluation mask that is provided with an evaluation pattern  
8 having at least two line patterns, focusing an image of said  
9 evaluation pattern on said evaluation mask onto the surface of  
10 said evaluation wafer by means of a projection optical system  
11 and exposing it to light;  
12 developing an exposed photosensitive film to form a  
13 plurality of transferred patterns on said photosensitive film  
14 each based on said evaluation patterns;  
15 distinguishing among said plurality of transferred  
16 patterns, between ones having all said line patterns and ones  
17 not having; and  
18 determining magnitude of coma aberration from the result  
19 of such distinction.

1 15. The coma aberration measuring method as claimed in Claim  
2 14, wherein a plurality of said evaluation patterns are provided  
3 on said evaluation mask and at least one of said line patterns

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4 is different from one another among said evaluation patterns.

1 16. The coma aberration measuring method as claimed in Claim  
2 15, wherein in each of said evaluation patterns, at least two  
3 said line patterns are formed as a line portion between a pair  
4 of reference lines; and

5            wherein in each of said transferred patterns, a relative  
6   positional deviation in a direction of line alignment of a center  
7   position of said line portion from a center position of said  
8   reference line pair is measured and the magnitude of coma  
9   aberration is determined based on said relative positional  
10   deviation.

1 17. The coma aberration measuring method as claimed in Claim  
2 14, wherein a plurality of transferred patterns are formed by  
3 executing said exposing a plurality of times with said evaluation  
4 mask while varying exposure amount for each exposure.

1 18. The coma aberration measuring method as claimed in Claim  
2 17, wherein in said evaluation pattern, at least two said line  
3 patterns are formed as a line portion between a pair of reference  
4 lines;

5 wherein in each of said transferred patterns a relative  
6 positional deviation in a direction of line alignment of a center  
7 position of said line portion from a center position of said  
8 reference line pair is observed; and

9            wherein the light exposure used for a transferred pattern  
10    in which that relative positional deviation becomes substantial

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11 is regarded as a critical exposure and the coma aberration which  
12 corresponds to this critical exposure is defined as the coma  
13 aberration for said optical system.

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